

REMARKS

In response to the Official Action:

[1] Claims 10-20 now depend from claim 1. If claim 1 is allowed then claims 10-20 can be reinstated and allowed.

[2-3] Claims 1-3 and 5-6 were rejected under § 103 over Nakamigawa JP '556 in view of Hirano US '749. This rejection is respectfully traversed.

Claim 1 as amended recites a semiconductor device comprising:

a semiconductor chip having a first main surface on which a plurality of electrode pads are provided, a second main surface which opposes said first main surface, and a plurality of side surfaces positioned between said first main surface and said second main surface;

an extension portion formed in contact with said side surfaces of said semiconductor chip so as to surround said semiconductor chip;

an insulating film formed on a surface of said extension portion and said first main surface such that a part of each of said electrode pads is exposed;

a plurality of wiring patterns formed on said insulating film so as to be electrically connected to said electrode pads, respectively and extended from said electrode pads to the surface of said insulating film on said extension portion and said first main surface;

a plurality of electrode posts formed on said wiring patterns;

a sealing portion formed on said wiring patterns and said insulating film such that the top surface of said electrode posts is exposed; and

a plurality of external terminals provided on the top surface of said electrode posts in a region including the upper side of said extension portion,

wherein the electrode pads are arranged in a first line extending in a first direction along a peripheral edge of the semiconductor chip on the first main surface, and the external terminals are arranged in a second line extending in a second direction perpendicular to said first direction, and are electrically and directly connected to the electrode pads in a one-on-one connection relationship.

The claimed arrangement of electrode pads and external terminals provides a greater degree of design freedom regarding disposal pitch, disposal positions, and so on, of the external terminals. Improvements in operational speed, functional sophistication, number of functions, compactness, and operational reliability can also be achieved.

Nakamigawa: (1) Nakamigawa aims to prevent breakage of a connecting portion between the printed board and external electrodes. Its semiconductor device is a semiconductor chip having electrode pads, wiring which is formed in a predetermined position on the semiconductor chip and connected to the electrode pads, external electrodes which are formed in a predetermined position on the wiring and connected to the wiring, a printed board connected to the external electrodes, and a substrate which is formed on the semiconductor chip. A resin layer is provided on the substrate for aligning the thermal expansion of the substrate and printed board, and, in particular, the external electrodes are provided on the resin layer.

(2) Accordingly, Nakamigawa does not attain the Applicant's above-mentioned advantage.

Hirano: (1) Hirano discloses a semiconductor device comprising a substrate having a square-shaped plane and having an interconnection formed on a first surface of first and second opposite surfaces; a semiconductor chip which is mounted on the first surface of the substrate and has an electrode formed on a first surface of first and second opposite surfaces of semiconductor chip, and a conductive wire for electrically connecting the electrode of the chip with the interconnection of the substrate, the interconnection having a plurality of connecting pads arranged from the peripheral side toward the inner side of the substrate. Hirano essentially comprises a conductive wire, a semiconductor chip, and a substrate (see Fig.14).

(2) In contrast, the Applicant does not need conductive wires because it is based on WCSP technique (see the Description of Related Art). Hirano uses connection by conductive wires between the substrate and the semiconductor chip mounted thereon, which means that Hirano is not based on the WCSP technique.

(3) Without conductive wires, the Applicant's semiconductor devices become thinner than conventional semiconductor devices such as Hirano's (see the Applicant's specification page 4, lines 4-14).

In other words, the Applicant's field of invention is different from Hirano's.

(4) Hirano discloses a connection from electrode pad (8) to the bump electrode (12) via a wire connecting pad (3B) and wirings (2) provided on the substrate (1), in addition to the conductive wire (10) (see Figs.14). In contrast, in the Applicant's semiconductor device electrode pads provided the semiconductor chip are electrically and *directly* connected to the electrode pads in a one-on-one connection relationship.

Combination. The applied references comprise features distinct from those of the other. Accordingly, it would have been difficult for a person of ordinary skill to reach the instant claims by combining Nakamigawa and Hirano.

As described above, the foregoing cited references do not in any way disclose or suggest the devices of claims of the invention, and even through the combination of such cited references, structures of the devices of claims of the invention is not obvious.

[4-5] Claim 4 is rejected under § 103 over Nakamigawa in view of Hirano and Jackson US '930. This rejection is respectfully traversed on the grounds set out above (and previously argued) and the dependence of claim 4.


[6] Claim 7 is rejected under § 103 over Nakamigawa in view of Hirano and Torres US '213. This rejection is respectfully traversed on the grounds set out above (and previously argued), and the dependence of claim 7.

[7] Claims 8 and 9 were rejected under § 103 over Nakamigawa in view of Hirano and Ma US '469. This rejection is respectfully traversed on the grounds set out above (and previously argued), and the dependence of the claims.

In view of the present amendments, withdrawal of the rejections and allowance are requested.

September 5, 2006
Date

Respectfully submitted,


Nick Bromer (Reg. No. 33,478)

(717) 426-1664

RABIN & BERDO, P.C.

CUSTOMER NO. 23995

Telephone: (202) 371-8976

Telefax : (202) 408-0924